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RESEARCH ARTICLE :

# Monitoring of pesticide residues in brinjal samples collected from three different markets of Warangal district - 2015

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**SUMMARY :** The brinjal samples were collected from three different vegetable markets *viz.*, Jangaon, Raghunathpally and Hanmakonda of Warangal district and analyzed for insecticide residues following the validated QuEChERS method, it was found that except methyl parathion all other organophosphate insecticides *i.e.*, dimethoate, malathion, chlorpyriphos, profenophos, quinalphos and ethion were detected in either of the three markets or in all the three markets and similarly among synthetic pyrethroids except fenpropathrin and beta-cyfluthrin all other insecticides like lambda cyhalothrin, cypermethrin, deltamethrin and fenvalerate were detected in either of the three markets or in all the three markets. The common insecticides that were found in the brinjal samples of all the three markets are chlorpyriphos, profenophos, ethion, lambda cyhalothrin and cypermethrin and so these insecticides except chlorpyriphos were chosen for the decontamination studies of the crop that has been raised in students' farm as per good agricultural practices of PJTSAU.

KEY WORDS :
Monitoring,
Vegetable markets,
Brinjal samples,
Pesticide residues

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## BACKGROUND AND OBJECTIVES

In India, brinjal is one of the most common, popular and principal vegetable crops grown throughout the country, estimated to cover about 8.14% vegetable area with a contribution of 9% of total vegetable production. The crop is largely grown in small plots or as inter crop both for cash and domestic consumption by farmers all over India. The major brinjal producing states are West Bengal, Orissa, Bihar, Gujarat, Maharashtra, Karnataka, Uttar Pradesh, Telangana and Andhra Pradesh. The crop is prone to damage by various insects, although there is wide variability in their degree of infestation. Some of the important insects are fruit and shoot borer, jassids, mites, beetles, aphids and mealy bugs. Brinjal is also subjected to the attack of many diseases affecting roots, leaves, stems and fruits.

Pesticides are widely used to combat the insect pest problem in brinjal. At different periods of crop growth, the crop is treated with different group of insecticides, giving rise to more chance of environmental pollution. Farmers believe that for better yield, the pesticide application is a very important parameter to be done during crop production. Thereby, they indiscriminately apply the pesticides over crops even at fruiting stage. This repeated application of pesticides on crops particularly at fruiting stage and non adoption of safe waiting period leads to accumulation of pesticide residues in fruits and vegetables.

The occurrence of pesticide residues in the farm gate or market samples of vegetables in India are reported by several workers. (Dethe *et al.,* 1995; Madan *et al.,* 1996; Parihar *et al.,* 1997; Gupta *et al.,* 1998 and Kumari *et al.,* 2003; 2004, 2005). Karanath (2002) has reported that about 50-70% of the vegetables are contaminated with the pesticides residues.

Hence, the present study of monitoring of pesticides is done globally to assess the environmental load of their residues. The regular monitoring of various raw and processed food commodities helps in reducing the level of pesticide residues through following of Good Agricultural Practices and also proper safe waiting periods.

## RESOURCES AND METHODS

The brinjal samples were collected from three different vegetable markets of Warangal *viz.,* local vegetable market at the Bus stand road, Jangaon; Raithu bazaar vegetable market near Bus stand, Hanmakonda and the local vegetable market, Raghunathpally. The sample size collected from each market was five kgs of brinjal. The samples were collected randomly from different vendors in the market to get a representative sample.

The collected brinjal samples were tested for different pesticide residues to find out the frequently used pesticides using QuEChERS method. The final extract of the sample *i.e.* 2 ml equal to 1 g of the sample was evaporated using turbovap and made upto 1 ml (equal to 1 g sample) using suitable solvent for analysis on GC, while for LC analysis, filtered 1 ml final extract (equal to 0.5 g sample) was directly injected in LC and the residues of pesticides recovered from fortified samples were calculated using the following formula :

$$\text{Residues (mg/kg)} = \text{volume of the sample} \times \frac{\text{Sample peak area} \times \text{conc of std. (ppm)} \times \mu\text{l std. injected} \times \text{Final}}{\text{Standard Peak area} \times \text{weight of sample analysed} \times \mu\text{l of sample injected}}$$

$$\text{Weight of the sample analysed} = \frac{\text{Sample weight (15g)} \times \text{aliquot taken}}{\text{Volume of acetonitrile (30 ml)}}$$

## OBSERVATIONS AND ANALYSIS

The brinjal samples collected from Jangaon vegetable market was contaminated with five organophosphates and three synthetic pyrethroids at detectable levels, and presented in table 1.The organophosphate insecticide residues detected were dimethoate (0.182 mg/kg), malathion (0.216 mg/kg), chlorpyriphos (0.312 mg/kg), profenophos (0.521 mg/kg), and ethion (0.032 mg/kg) whereas methyl parathion and quinalphos were not detected. The synthetic pyrethroid residues detected were lambda cyhalothrin (0.028 mg/kg), cypermethrin (0.046 mg/kg) and fenvalerate (0.006 mg/kg), while the fenpropathrin, beta-cyfluthrin and deltamethrin were not detected.

The brinjal samples collected from Raghunathpally

**Table 1 : Residue levels of various insecticides in brinjal samples collected from vegetable market, Jangaon**

| Sr. No. | Insecticide | Residues (mg/kg) |
|---|---|---|
| **Organophosphates** | | |
| 1. | Dimethoate | 0.182 |
| 2. | Malathion | 0.216 |
| 3. | Chlorpyriphos | 0.312 |
| 4. | Profenophos | 0.521 |
| 5. | Ethion | 0.032 |
| **Synthetic pyrethroids** | | |
| 6. | Lambda cyhalothrin | 0.028 |
| 7. | Cypermethrin | 0.046 |
| 8. | Fenvalerate | 0.006 |

vegetable market was contaminated with four organophosphates and two synthetic pyrethroids at detectable levels and presented in table 2. The organophosphate insecticide residues detected were chlorpyriphos (0.026 mg/kg), profenophos (0.045 mg/kg), quinalphos (0.314 mg/kg) and ethion (0.054 mg/kg), while dimethoate, methyl parathion and malathion were not detected. The synthetic pyrethroid insecticide residues detected were lambda cyhalothrin (0.021 mg/kg) and cypermethrin (0.031 mg/kg), while fenpropathrin, beta-cyfluthrin, deltamethrin and fenvalerate were not detected.

The brinjal samples collected from Hanmakonda vegetable market were contaminated with five organophosphates and three synthetic pyrethroids at detectable levels and presented in table 3. The detected

**Table 2 : Residue levels of various insecticides in brinjal samples collected from vegetable market, Raghunathpally**

| Sr. No. | Insecticide | Residues (mg/kg) |
|---|---|---|
| **Organophosphates** | | |
| 1. | Chlorpyriphos | 0.026 |
| 2. | Profenophos | 0.045 |
| 3. | Quinalphos | 0.314 |
| 4. | Ethion | 0.054 |
| **Synthetic pyrethroids** | | |
| 5. | Lambda cyhalothrin | 0.021 |
| 6. | Cypermethrin | 0.031 |

**Table 3 : Residue levels of various insecticides in brinjal samples collected from vegetable market, Hanmakonda**

| Sr. No. | Insecticide | Residues (mg/kg) |
|---|---|---|
| **Organophosphates** | | |
| 1. | Malathion | 0.008 |
| 2. | Chlorpyriphos | 0.211 |
| 3. | Profenophos | 0.426 |
| 4. | Quinalphos | 0.342 |
| 5. | Ethion | 0.062 |
| **Synthetic pyrethroids** | | |
| 6. | Lambda cyhalothrin | 0.064 |
| 7. | Cypermethrin | 0.062 |
| 8. | Deltamethrin | 0.065 |

**Table 4 : Residue levels of various insecticides in brinjal samples collected from three vegetable markets. (Residues (mg/kg)**

| Sr. No. | Insecticides | Jangaon | Raghunathpally | Hanmakonda |
|---|---|---|---|---|
| **Organophosphates** | | | | |
| 1. | Dimethoate | 0.182 | N.D | N.D |
| 2. | Malathion | 0.216 | N.D | 0.008 |
| 3. | Chlorpyriphos | 0.312 | 0.026 | 0.211 |
| 4. | Profenophos | 0.521 | 0.045 | 0.426 |
| 5. | Quinalphos | N.D | 0.314 | 0.342 |
| 6. | Ethion | 0.032 | 0.054 | 0.062 |
| **Synthetic pyrethroids** | | | | |
| 1. | Lambda cyhalothrin | 0.028 | 0.021 | 0.064 |
| 2. | Cypermethrin | 0.046 | 0.031 | 0.062 |
| 3. | Deltamethrin | N.D | N.D | 0.065 |
| 4. | Fenvalerate | 0.006 | N.D | N.D |

N.D- Not Detected

organophosphate insecticide residues were of malathion (0.008 mg/kg), chlorpyriphos (0.211 mg/kg), profenophos (0.426 mg/kg), quinalphos (0.342 mg/kg) and ethion (0.062 mg/kg), while dimethoate and methyl parathion were not detected. The detected synthetic pyrethroid insecticide residues were of lambda cyhalothrin (0.064 mg/kg), cypermethrin (0.062 mg/kg) and deltamethrin (0.065 mg/kg), while fenpropathrin, beta-cyfluthrin and fenvalerate were not detected.

The insecticide residues in brinjal samples collected from three vegetable markets *i.e.*, Jangaon, Raghunathpally and Hanmakonda were presented in Table 4. The detected insecticides were six organophosphates and four synthetic pyrethroids. The organophosphate detected insectides in any of the three markets were dimethoate, malathion, chlorpyriphos, profenophos, quinalphos and Ethion. Similarly the synthetic pyrethroids detected in any of the three markets were lambda cyhalothrin, cypermethrin, deltamethrin and fenvalerate.

## Conclusions :

In the present study, it was found that except methyl parathion all other organophosphate insecticides *i.e.*, dimethoate, malathion, chlorpyriphos, profenophos, quinalphos and ethion were detected in either of the three markets or in all the three markets and similarly among synthetic pyrethroids except fenpropathrin and beta-cyfluthrin all other insecticides like lambda cyhalothrin, cypermethrin, deltamethrin and fenvalerate were detected in either of the three markets or in all the three markets.The insecticides that were found in common in the brinjal samples of all the three markets are chlorpyriphos, profenophos, ethion, lambda cyhalothrin and cypermethrin and so these insecticides except chlorpyriphos were chosen for the decontamination studies of the crop that has been raised in students' farm as per good agricultural practices of PJTSAU.

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